AMENDMENTS TO THE CLAIMS

1.-65. (Canceled)

66. (Currently amended) A method for analyzing a polymer comprising:

providing the polymer having first and second unit specific markers, the first unit specific marker including a first label and the second unit specific marker including a second label, wherein the first and second unit specific markers are spaced apart on the polymer by a separation distance;

providing a detection zone adapted to detect emission signals, the detection zone characterized by a zone distance;

establishing a timing event;

moving the polymer through the detection zone at a velocity while establishing the timing event, any count of emissions collected from the detection zone being reset upon the establishment of the timing event;

detecting a first emission signal that is emitted by the label of the first unit specific marker as the first unit specific marker passes through the detection zone;

identifying a proportion of the first emission signal that corresponds to a distance of the detection zone ~~that has been~~ traversed by the label of the first unit specific marker at the timing event~~, the proportion of the first emission signal being identified by comparing a part of the first emission signal that is detected before the timing event and a part of the first emission signal that is detected after the timing event~~;

detecting a second emission signal that is emitted by the label of the second unit specific marker as the second unit specific marker passes through the detection zone;

identifying a proportion of the second emission signal that corresponds to a distance of the detection zone ~~that has been~~ traversed by the label of the second unit specific marker at the timing event~~, the proportion of the second emission signal being identified by comparing a part of the second emission signal that is detected before the timing event and a part of the second emission signal that is detected after the timing event~~;

determining the separation distance by comparing the proportion of the first signal and the proportion of the second signal to determine the separation distance in analyzing the polymer; and

outputting an indication of the separation distance to a user.

67. (Currently amended) The method of claim 136 [[66]], wherein identifying the proportion of the first emission signal that corresponds to the distance of the detection zone that has been traversed by the label of the first unit specific marker at the timing event comprises dividing the ~~part~~ emission count of the first emission signal that is detected before the timing event by all of the first emission signal.

68. (Currently amended) The method of claim 67, wherein identifying the proportion of the second emission signal that corresponds to the distance of the detection zone that has been traversed by the label of the second unit specific marker at the timing event comprises dividing the ~~part~~ emission count of the second emission signal that is detected before the timing event by all of the second emission signal

69. (Withdrawn – currently amended) The method of claim 136 [[66]], wherein identifying the proportion of the first emission signal that corresponds to the distance of the detection zone that has been traversed by the label of the first unit specific marker at the timing event comprises dividing the ~~part~~ emission count of the first emission signal that is detected after the timing event by all of the first emission signal.

70. (Withdrawn – currently amended) The method of claim 69, wherein identifying the proportion of the second emission signal that corresponds to the distance of the detection zone that has been traversed by the label of the second unit specific marker at the timing event comprises dividing the ~~part~~ emission count of the second emission signal that is detected after the timing event by all of the second emission signal

71. (Currently amended) The method of claim 66[[68]], wherein the first label and the second label are distinct types of labels.

72. (Previously presented) The method of claim 71, wherein the timing event comprises a single timing event for identifying the proportion of the first emission signal and identifying the proportion of the second emission signal.

73. (Previously presented) The method of claim 72, wherein determining the separation distance comprises multiplying the proportion of the first signal and the proportion of the second signal by the zone distance to define a first distance and a second distance, respectively; and then

subtracting the second distance from the first distance to define the separation distance.

74. (Withdrawn) The method of claim 72, wherein determining the separation distance comprises subtracting the proportion of the second signal from the proportion of the first signal to define a separation factor; and then

multiplying the separation factor by the zone distance to define the separation distance.

75. (Withdrawn) The method of claim 71, wherein the timing event comprises two distinct timing events, a first timing event for identifying the proportion of the first emission signal and a second timing event that occurs one reset time immediately after the first timing event, the second timing event for identifying the proportion of the second emission signal.

76. (Withdrawn) The method of claim 75, further comprising:

calculating a reset distance by multiplying the velocity by the reset time;

wherein determining the separation distance comprises multiplying the proportion of the first signal and the proportion of the second signal by the zone distance to define a first distance and a second distance, respectively; then

subtracting the second distance from the first distance; and then

adding the reset distance to the first distance to define the separation distance.

77. (Withdrawn) The method of claim 75, further comprising:

calculating a reset distance by multiplying the velocity by the reset time;

wherein determining the separation distance comprises subtracting the proportion of the second signal from the proportion of the first signal to define a separation factor; then

multiplying the separation factor by the zone distance; and then

adding the reset distance to define the separation distance.

78. (Withdrawn – currently amended) The method of claim 66 [[68]], wherein the timing event comprises two distinct timing events, a first timing event for calculating the proportion of the first emission signal and a second timing event that occurs later and is separated by one or more timing events within a series of timing events, the second timing event for calculating the proportion of the second emission signal.

79. (Withdrawn) The method of claim 78, further comprising:

calculating a reset distance by multiplying the velocity by the reset time;

wherein determining the separation distance comprises multiplying the proportion of the first signal and the proportion of the second signal by the zone distance to define a first distance and a second distance, respectively; and

further wherein the second distance is subtracted from the first distance and a number of reset distances equivalent to the number of timing events, are added to the first distance to define the separation distance.

80. (Withdrawn) The method of claim 78, further comprising:

calculating a reset distance by multiplying the velocity by the reset time;

wherein determining the separation distance comprises subtracting the proportion of the second signal from the proportion of the first signal; and

further wherein the separation factor is multiplied by the zone distance and a number of reset distances, equivalent to the number of timing events, are added to define the separation distance.

81. (Withdrawn) The method of claim 79, wherein the first label and the second label comprise similar types of labels.

82. (Withdrawn) The method of claim 79, wherein the first label and the second label are distinct types of labels.

83. (Withdrawn) The method of claim 80, wherein the first label and the second label comprise similar types of labels.

84. (Withdrawn) The method of claim 80, wherein the first label and the second label are distinct types of labels.

85. (Withdrawn) The method of claim 84, wherein the first unit specific marker is different from the second unit specific marker.

86. (Withdrawn) The method of claim 83, wherein the first unit specific marker is identical to the second unit specific marker.

87. (Withdrawn) The method of claim 86, wherein the polymer is labeled with a third unit specific marker comprising a third label.

88. (Previously presented) The method of claim 66, wherein the first and second unit specific markers are nucleic acid molecules.

89. (Previously presented) The method of claim 66, wherein the first and second unit specific markers are peptide nucleic acid molecules or locked nucleic acid molecules.

90. (Previously presented) The method of claim 66, wherein the first and second unit specific markers have an identical nucleotide sequence.

91. (Previously presented) The method of claim 66, wherein the first and second unit specific markers are less than 12 bases in length.

92. (Previously presented) The method of claim 66, wherein the first and second unit specific markers are at least 4 bases in length.

93. (Previously presented) The method of claim 66, wherein the first label and second label are selected from the group consisting of an electron spin resonance molecule, a fluorescent molecule, a chemiluminescent molecule, a radioisotope, an enzyme substrate, an enzyme, a biotin molecule, an avidin molecule, an electrical charge transferring molecule, a semiconductor nanocrystal, a semiconductor nanoparticle, a colloid gold nanocrystal, a ligand, a microbead, a magnetic bead, a paramagnetic molecule, a quantum dot, a chromogenic substrate, an affinity molecule, a protein, a peptide, a nucleic acid, a carbohydrate, a hapten, an antigen, an antibody, an antibody fragment, and a lipid.

94. (Previously presented) The method of claim 66, wherein the signals are detected using a detection system selected from the group consisting of an electron spin resonance (ESR) detection system, a charge coupled device (CCD) detection system, a fluorescent detection system, an electrical detection system, an electromagnetic detection system, a photographic film detection system, a chemiluminescent detection system, an enzyme detection system, an atomic force microscopy (AFM) detection system, a scanning tunneling microscopy (STM) detection system, an optical detection system, a nuclear magnetic resonance (NMR) detection system, a near field detection system, and a total internal reflection (TIR) detection system.

95. (Previously presented) The method of claim 66, wherein the polymer is a nucleic acid molecule.

96. (Previously presented) The method of claim 66, wherein the polymer is genomic DNA or RNA.

97. (Previously presented) The method of claim 66, wherein the polymer comprises a backbone that includes a label.

98. (Previously presented) The method of claim 75, wherein the reset time is between 0.01 and 1000 milliseconds.

99. (Previously presented) The method of claim 66, wherein the detection zone is circular and the zone distance is a diameter of the detection zone.

100 – 133. Cancelled.

134. (Currently amended) A method for analyzing a polymer comprising:

a) providing a detection zone having a known detection resolution, the detection zone characterized by a zone distance;

b) labeling the polymer with first and second unit specific markers, the first unit specific marker including a first label and the second unit specific marker including a second label distinct from the first label, wherein the first and second unit specific markers are spaced apart on the polymer by a separation distance such that, if the labels were not distinct from each other, they would be separated by a distance less than the detection resolution;

c) exposing the polymer labeled as in (b) to the detection station to produce distinct first and second emission signals arising from the first and second labels, respectively;

d) establishing a timing event;

e) moving the polymer through the detection zone at a velocity while establishing the timing event, any count of emissions collected from the detection zone being reset upon the establishment of the timing event;

f) identifying the first emission signal emitted by the label of the first unit specific marker as the first unit specific marker passes through the detection zone;

g) identifying the second emission signal emitted by the label of the second unit specific marker as the second unit specific marker passes through the detection zone;

h) identifying a proportion of the first emission signal that corresponds to a distance of the detection zone ~~that has been~~ traversed by the label of the first unit specific marker at the timing event~~, the proportion of the first emission signal being identified by comparing a part of the first emission signal that is detected before the timing event and a part of the first emission signal that is detected after the timing event~~;

i) identifying a proportion the second emission signal that corresponds to a distance of the detection zone ~~that has been~~ traversed by the label of the second unit specific marker at the timing event~~, the proportion of the second emission signal being identified by comparing a part of the second emission signal that is detected before the timing event and a part of the second emission signal that is detected after the timing event~~;

j) determining the separation distance by comparing the proportion of the first signal and the proportion of the second signal to determine the separation distance in analyzing the polymer; and

k) outputting an indication of the separation distance to a user.

135. The method of claim 134, wherein the proportion of the first emission signal is identified by comparing an emission count of the first emission signal that is detected before the timing event and an emission count of the first emission signal that is detected after the timing event and wherein the proportion of the second emission signal is identified by comparing an emission count of the second emission signal that is detected before the timing event and an emission count of the second emission signal that is detected after the timing event;

136. The method of claim 66, wherein the proportion of the first emission signal that corresponds to the distance of the detection zone traversed by the label of the first unit specific marker at the timing event is identified by comparing an emission count of the first emission signal

that is detected before the timing event and an emission count of the first emission signal that is detected after the timing event; and

wherein the proportion of the second emission signal that corresponds to the distance of the detection zone traversed by the label of the second unit specific marker at the timing event is identified by comparing an emission count of the second emission signal that is detected before the timing event and an emission count of the second emission signal that is detected after the timing event.